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A new species of *Pogonomyrmex* (Hymenoptera: Formicidae) from gallery forests of the Orinoco Watershed, Venezuela

John E. LATTKE

Abstract

Pogonomyrmex stefani sp.n. is described from gallery forests of the Orinoco Watershed in southern Venezuela. In contrast with other species of *Pogonomyrmex* MAYR, 1868 from northern South America that usually occur in more open, semiarid environments or occasionally in cloud forests, it nests in humid soil in the dense shade of gallery forest canopy. A key for identifying workers of *Pogonomyrmex* from northern South America is included.

Key words: *Pogonomyrmex*, new species, key, Venezuela, Orinoco, gallery forest.

Dr. John E. Lattke, Instituto de Zoología Agrícola, Universidad Central de Venezuela, Apartado 4579, Maracay 2101-A, Venezuela. E-mail: piquihuye@hotmail.com

Introduction

Ants of the genus *Pogonomyrmex* MAYR, 1868 are a group of approximately 70 species found mostly in temperate South America, Mexico, and southwestern United States. Recent general works include an overview of the genus by TABER (1998), including identification keys and a proposed phylogeny, and JOHNSON (2000) who studied the ecology and biogeography of North American *Pogonomyrmex*, and other seed harvesting ants. The rich fauna of Argentina is poorly known, and only recently is being studied in detail. Since the pioneering work by KUSNEZOV (1949, 1951), no general studies of *Pogonomyrmex* from this region exist. VÁZQUEZ-BOLAÑOS & MACKAY (2004) describe a new species from dry forests in Michoacán, México. The greatest diversity is found in arid habitats (TABER 1998, JOHNSON 2001), but some species have recently been discovered in cloud forests of northern South America (LATTKE 1990, FERNÁNDEZ & PALACIO 1998). This paper reports the discovery of a new species in another mesic habitat, gallery forests of the Orinoco Watershed.

Material and methods

Using comparative methodology, a series of specimens of the ant genus *Pogonomyrmex* collected in one site in southern Venezuela were studied. A Nikon SMZ 1500 Stereoscopic Microscope with 10× ocular lens was used for observing the specimens.

Collection Acronyms. Specimens used in this study have been deposited in the following collections:

BMNH The Natural History Museum, London, England, UK
CASC California Academy of Sciences Collection, San Francisco, California, USA
ICNB Instituto de Ciencias Naturales, Universidad Nacional de Colombia, Bogotá, D.E., Colombia
MCZC Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA
MIZA Museo del Instituto de Zoología Agrícola, Universidad Central de Venezuela, Maracay, Aragua, Venezuela
MZSP Museu de Zoologia, Universidade de São Paulo, São Paulo, Brazil
NHMW Naturhistorisches Museum, Vienna, Austria
WPMC William P. Mackay Collection, El Paso, Texas, USA

Measurements. Measurements were carried out using an ocular micrometer at 40×. All of the following measurements are expressed in millimeters:

HL Head length: midline length of cephalic capsule, measured in full-face (dorsal) view, from anterior margin of clypeus to midpoint of a line drawn across pre-occipital margin.
HW Head width: maximum width of cephalic capsule, measured in the same plane as HL, excluding eyes.
ML Mandible length: straight-line length of mandible, measured from base at insertion into head capsule, to mandibular apex. Measured in same plane as HL.
EL Eye length: maximum length of compound eye, in the same plane as HL.
SL Scape length: maximum length of first antennal segment, excluding neck and basal condyle. Taken with head in posterior view.
PW Maximum width of pronotum in dorsal view.
MsL Mesosoma length: straight-line distance measured in lateral view from anterior margin of pronotum (excluding collar) to posterior extremity of metapleural lobe.

Indices. The following indices were calculated from the preceding measurements:

CI Cephalic index: HW / HL
MI Mandibular index: ML / HW
OI Ocular index: ED / HW
SI Scape index: SL / HW

Results

***Pogonomyrmex stefani* sp.n.** (Figs. 1 - 4)

Type material. Holotype (worker). Venezuela, Bolívar: Fundo San Rafael, Río Villacoa, 165 m (6° 25' N, 67° 01' W), 6.XII.2004, leg. J.E. Lattke, #2964. Deposited in Mu-

seo del Instituto de Zoología Agrícola, Maracay, Venezuela. – Paratypes: 11 workers, all from the same locality and date as the holotype and leg. J.E. Lattke: #2964 (2 ☿☿ MIZA, 1 ☿ NHMW, 1 ☿ CASC, 1 ☿ MCZC, 1 ☿ BMNH). #2965 (2 ☿☿ MIZA, 1 ☿ MZSP, 1 ☿ WPMC). #2966 (1 ☿ ICNB).

Additional material. Venezuela, Bolívar: c. Amarawai Tepui, 470 m (5° 55' N, 62° 15' W), 2.V.1986, leg. J.E. Lattke, 1 ♂ (MIZA).

Diagnosis. Scape longitudinally striate with suberect hairs; compound eye with 5 - 9 hairs between ommatidia; dorsal propodeal tooth slender and acutely pointed, more than twice as long as the broadly triangular ventral propodeal tooth; length of peduncle similar to length of node; petiolar node rugulose to striate; procoxa with fine parallel, transverse striae in lateral view.

Description of worker. Holotype (Paratypes, n = 4, notation: minimum - maximum). HL 1.39 (1.34 - 1.39); HW 1.32 (1.24 - 1.32); ML 0.68 (0.63 - 0.78); EL 0.23 (0.23 - 0.27); SL 1.11 (1.06 - 1.11); PW 0.89 (0.86 - 0.91); MsL 1.64 (1.54 - 1.64); PH 0.03 (0.03 - 0.03); PL 0.03 (0.03 - 0.03); DPW 0.03 (0.03 - 0.03) mm. CI 0.95 (0.92 - 0.95); MI 0.52 (0.48 - 0.62); OI 0.17 (0.18 - 0.2); SI 0.85 (0.84 - 0.88).

Head subquadrate in frontal view, posterior margin nearly straight with slight median incision, posterior corners broadly curved, lateral margin straight, head widest posterad, anterior clypeal margin with a narrow transverse lamella, lamella rounded laterad, medially with short rounded lobe. Scape surpasses posterior cephalic border by less than one apical diameter, scape longitudinally striate with suberect hairs, without pubescence. Head longitudinally striate-punctulate, median 3 - 5 striae relatively straight, striae become rugulose laterad; dorsal face of clypeus convex in longitudinal section, dorsal face longitudinally striate, extending posterad between frontal lobes as triangular lobe sharply separated from lobes by shallow sulcus, union of frontal lobes with short longitudinal sulcus. Compound eye ovoid, with 5 - 9 hairs. Mandibular masticatory margin with 6 teeth, dorsum striate, external margin broadly convex in dorsal view.

Mesosoma with convex dorsal margin in lateral view, metanotal groove not evident; lateral pronotum, meso-, and metapleuron rugulose, lateral propodeal face transversely striate; posteroventral pronotum with lobe that extends over procoxa; anteroventral margin of mesopleuron with flange that extends over procoxa, covering its posterodorsal region. Mesosoma mostly rugose in dorsal view, pronotal collar transversely striate; mesonotum with longitudinally directed rugosities; propodeum transversely rugose; prosternum with fine parallel striae. Dorsal propodeal tooth slender and acutely pointed, more than twice as long as broadly triangular ventral propodeal tooth; distance separating dorsal teeth shorter than their respective lengths; propodeal spiracle prominent, round.

Petiole with mostly smooth and shining peduncle and sternite, peduncle dorsolaterally with crest that extends from base and curves posteroventrad between spiracle and node; peduncle about as long as node. Node with sinuate anterior margin, apical tooth with convex anterior margin, bluntly pointed, directed dorsad to posterodorsad; dorsal margin of node broadly convex, lateral face with longitudinal to oblique rugulae and striae; anteroventral tooth acutely pointed. Postpetiole with brief anterior margin forming almost right angle with broadly convex dorsal margin in lateral view, posterior third of dorsal margin concave; ventral margin projects anteroventrad, with brief anterior margin and irregularly convex ventral margin. Postpetiolar sternite mostly smooth and shining. Node in dorsal view rugulose, postpetiole smooth with sparse punctae and depressions associated with each puncture. Gaster smooth and shining with sparse piligerous punctulae.

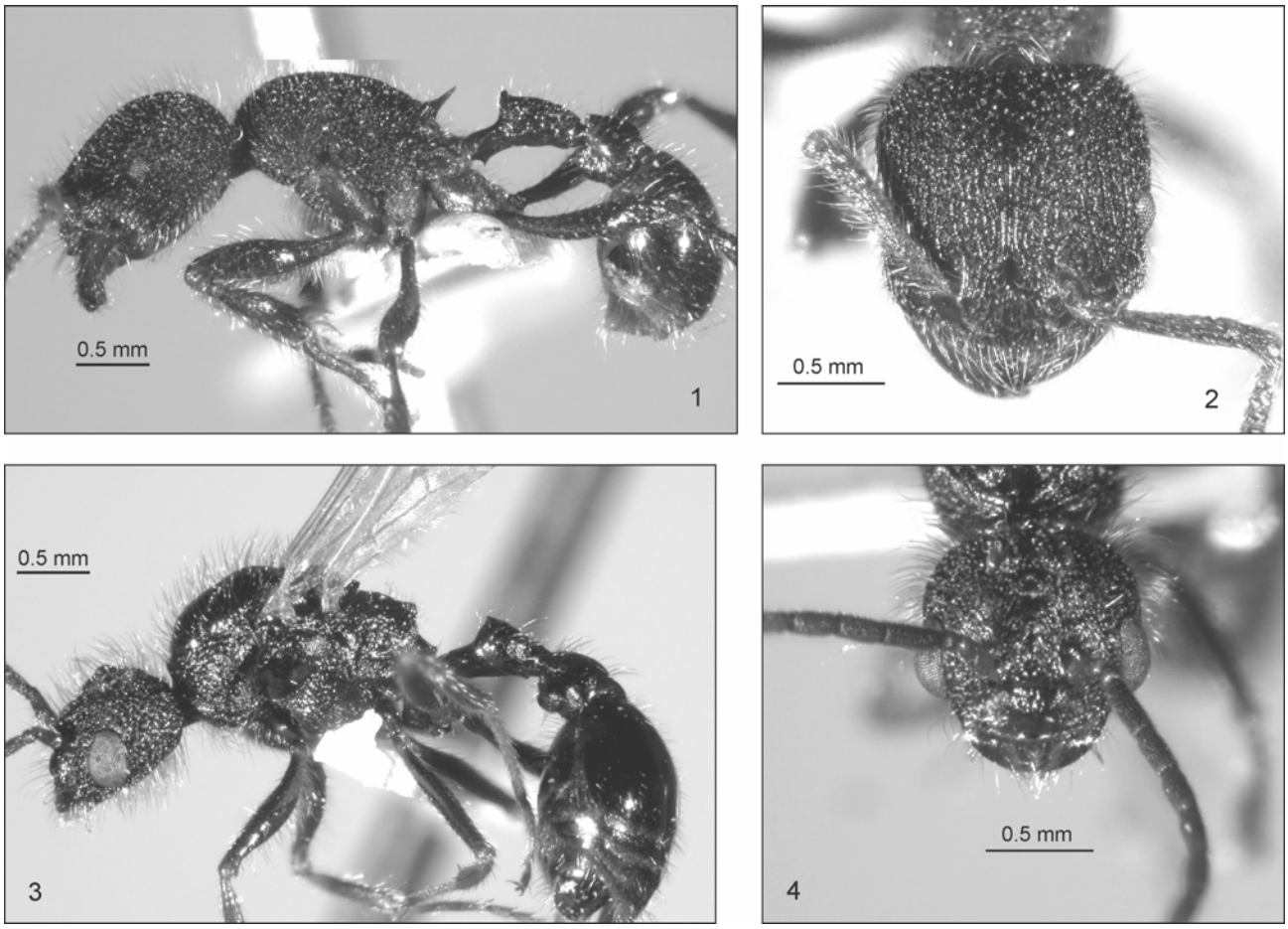
Procoxa with fine transverse striae in lateral view; profemur mostly smooth and shining with low rugulae along dorsum and base; lateral faces of mesocoxa with transverse striae apicad, tending to smooth basad; dorsum of metacoxa with oblique striae; metacoxa mostly smooth with piligerous punctae, apically striate to rugulose; metatibia and first metatarsal segment mostly longitudinally striate. Body with abundant erect to suberect flexuous hairs, no psammophore, dorsal surface of petiolar peduncle with short, erect pilosity. Head, antennae, mesosoma, petiole and postpetiole dark brown; mandibles, legs, gaster brown; hairs golden.

Queen. Unknown.

Description of male. n = 1. HL 1.06; HW 1.04; ML 0.25; EL 0.44; SL 0.25; PW 1.14; MsL 1.87. CI 0.98; MI 0.24; OI 0.43; SI 0.24.

Head with posterolateral margins forming broad convexity in frontal view; head width greater posterad of eyes; ocular-malar margin convex, approximately as long as lateral ocellus; closed mandibles forming continuous convexity in frontal view; eye convex, occupying more than one-third lateral cephalic margin. Ocelli well developed, lateral ocellus separated from other by more than greatest diameter. Head mostly areolate, with fine rugulae or areolae within each larger areola; frons with longitudinal to slightly oblique striae, small smooth area present next to anterior margin of median ocellus. Clypeus with fine areolae, smooth area present between anterior margin of scape insertion and posterior clypeus. Anterior clypeal margin with weak median concavity. Scape with elongate rugulae. Mandibles narrow, striate with approximately 5 teeth, some partially fused at base. Pronotum transversely striate anterad, striae thinning away and becoming oblique laterad, posterolaterally mostly finely areolate with few striae. Scutum prominent, medially with weak fine areolae that become mostly smooth laterad, posterolaterally well-impressed, with striae; lateral scutum smooth anterad with piligerous punctae, becoming rugose posterad with weak background areola; notauli scrobiculate. Scutellum dome-shaped, rugulose; propodeum rugulose, with bluntly angular to rounded lateral lobes; anepisternum anteriorly smooth, posteriorly finely areolate; katepisternum and metapleuron rugulose. Petiole in lateral view with triangular node; peduncle mostly smooth, node and postpetiole finely areolate; gaster smooth and shining, black. Head and scutum with abundant flexuous golden hairs, pilosity not as dense on rest of body.

Biology and discussion: Nest entrances are exposed, and found in moist, very fine soil beneath the closed shade of a gallery forest with sparse understory plants. Workers are relatively abundant and conspicuous on the ground, but some were also taken whilst foraging on low herbaceous vegetation. Ants from series #2964, and #2965 were not excavated from their nests, but collected when they were



Figs. 1 - 4: *Pogonomyrmex stefani* sp.n. (1) Lateral view of worker body; (2) dorsal view of worker head; (2) lateral view of male body; (4) dorsal view of male head.

approaching their apparent respective nest entrances, so they may not be nest-mates. At the time of capture these ants were taken for a dark variety of *Pogonomyrmex naegelii* FOREL, 1878, which nests in the open savannas beyond the gallery forest. The described male is most probably *P. stefani* on account of its similarity to the workers in size, colour, and pilosity. A large savanna and gallery forest are near Amarawai Tepui next to the Akanán River. Sporadic sampling of leaf litter with sifters and Winkler extractors in (non gallery forest) forested areas of the same region of the type locality failed to retrieve any additional specimens of *P. stefani*, leading to the suspicion that this ant may be endemic to gallery forests of the Orinoco Watershed.

This species adds another dimension to the habitats settled by *Pogonomyrmex* in northern South America: lowland mesic forests, differing from the other forest dwelling species, *P. striatinodus* FERNÁNDEZ & PALACIO, 1998, and *P. sylvestris* LATTKE, 1990 which prefer the cloud forests of higher elevations (LATTKE 1990, FERNÁNDEZ & PALACIO 1998). Since its description, *P. sylvestris* has been collected several more times in cloud forests of the eastern Venezuelan Andes close to Boconó, including a nest in a rotten log on the ground. The other species of *Pogonomyrmex* found in this region, *P. naegelii*, and *P. mayri* FOREL, 1899, dwell in arid habitats. In southern Venezuela, *P. naegelii* is a soil nester found in open savannas. *Pogonomyrmex mayri* is mostly found in thorn forest, and very dry forest below 850 m about the northern slopes of Sierra Nevada de Santa Marta in northeastern Colombia (KUGLER & HINCAPIÉ 1983, DIX & al. 2005, GUERRERO 2005). Nevertheless, *P. mayri* workers have been taken in scant quantities in humid forest with dense canopy and rich leaf litter at 835 m in the Sierra Nevada (GUERRERO 2005), indicating the upper extreme of their altitudinal distribution. With the discovery of these species, the distribution of *P. theresiae* FOREL, 1899 in western Ecuador (FOREL 1899) can no longer be considered so isolated and enigmatic. Its type locality, Estero Salado, is now a port area popular with tourists, and surrounded by the urban sprawl of Guayaquil. It was formerly a mangrove forest, surrounded on dry land by arid coastal forests, the likely habitat for *Pogonomyrmex*. Its rediscovery remains a challenge for Ecuadorian myrmecologists.

The following key should provide sufficient characters to separate *P. stefani* from the other *Pogonomyrmex* of northern South America. The only other known sympatric species of *Pogonomyrmex* is *P. naegelii*, and it is quite easy to separate from *P. stefani* on account of its ferruginous color, stiff and sparse bristle-like pilosity, the concave anterior clypeal margin, lack of a dentiform subpetiolar process, and presence of a shallow metanotal groove, amongst other characters. *Pogonomyrmex stefani* shares with *P. sylvestris* the presence of hairs between the ommatidia, texture of the body pilosity, median clypeal tooth, dentiform subpetiolar process, and an obliterated metanotal groove,

implying a closer relation to *P. sylvestris* than to *P. naegelii*. *Pogonomyrmex* is primarily known for its diverse fauna in temperate North and South America, mostly adapted for collecting seeds in arid, open habitats. The rare tropical members now include the presence of cloud forest species, with at least one that nests in rotten logs, and a gallery forest species nesting in humid soil, mesic habitats that do not imply specialised adaptations for avoiding desiccation. This further supports a humid tropical origin for the genus as proposed by KUSNEZOV (1951) and corroborated by LATTKE (1990), FERNÁNDEZ & PALACIO (1998), and TABER (1998). Given the increasing variety of habitats now known to harbour species of *Pogonomyrmex* it is likely additional species of this genus may be discovered in tropical South America, thus filling gaps in our knowledge of the evolution of this group.

Etymology. The species name honours the late Stefan Schödl, who occupied the post of Curator of Hymenoptera in the Naturhistorisches Museum of Vienna until his death in April, 2005. I will remain forever indebted to Dr. Schödl for his invaluable assistance in making type specimens accessible during the course of revisionary studies.

Identification key for workers of the genus *Pogonomyrmex* from northern South American (adapted from FERNÁNDEZ & PALACIO 1998)

1 Anteroventral cephalic area with several hairs close to buccal cavity, much longer than others, forming psammophore; propodeal spines absent; mesosoma finely striate (Ecuador). .... *P. theresiae*

– Anteroventral cephalic area without conspicuous long hairs close to buccal cavity; propodeal spines present and well developed; mesosomal sculpture rugose-reticulate or with coarse striae. 2

2 Anterior clypeal margin medially concave, without median tooth or lobe; apex of petiolar node in lateral view forms blunt to sharp angle, lacking tooth (Colombia – Argentina). ..... *P. naegelii*

– Anterior clypeal margin straight to slightly concave but always with median tooth, sometimes reduced to low blunt lobe; apex of petiolar node with distinct tooth. 3

3 Body pilosity short and stiff, longest mesosomal hairs shorter than dorsal propodeal teeth; apex of petiolar tooth pointing anterad; mesosoma with coarse striae, subpetiolar process broadly triangular with blunt apex (northern Colombia). ..... *P. mayri*

– Body pilosity long, flexuous, longest mesosomal hairs as long as dorsal propodeal teeth; apex of petiolar tooth slightly curved posterad, apex pointing dorsad to posterodorsad; mesosoma with rugose reticulation; subpetiolar process dentiform, apex sharply pointed. 4

4 Mandible with seven teeth; ventral propodeal teeth as long as dorsal propodeal teeth; compound eye without hairs between the ommatidia (southwestern Colombia). ..... *P. striatinodus*

– Mandible with 6 teeth; ventral propodeal teeth shorter than dorsal teeth; compound eye with at least 3 - 4 hairs between ommatidia. 5

5 Procoxa finely imbricate in lateral view; mesosoma and head rugose-punctate, each puncture smooth and shining; petiolar node smooth to undulated, shining (western Venezuela). .... *P. sylvestris*

– Procoxa transversely striate in lateral view; mesosoma and head rugulose-punctulate, punctulae small and opaque; petiolar node rugulose-punctulate (southern Venezuela). ... *P. stefani* sp.n.

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Zusammenfassung

Die neu entdeckte Ameisenart *Pogonomyrmex stefani* sp.n. wird aus Galeriewäldern im Einzugsgebiet des Orinocos im Süden Venezuelas beschrieben. Im Unterschied zu anderen *Pogonomyrmex*-Arten aus dem nördlichen Südamerika, welche in offenen, semiariden Lebensräumen oder gelegentlich in Nebelwäldern leben, legt *P. stefani* seine Nester in feuchtem Boden im dunklen Schatten von Galeriewäldern an. Ein Bestimmungsschlüssel für *Pogonomyrmex*-Arbeiterinnen aus dem nördlichen Südamerika wird vorgestellt.

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